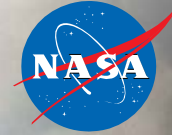


National Aeronautics and Space Administration



# Overview of Research Transition Products

John Robinson, NASA  
July 14, 2014





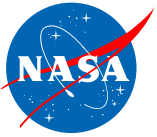
# Objectives



- Demonstrate increased, more consistent use of Performance-Based Navigation (PBN)



- Accelerate transfer of NASA scheduling and spacing technologies for inclusion in late mid-term NAS



# ATM Demonstration #1 (ATD-1): Integrated Arrival Solution



Flight Deck Interval Management  
(FIM) for Arrival Operations



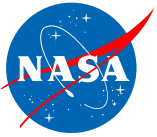
NASA Technologies  
plus  
ADS-B Infrastructure  
Area Navigation (RNAV) Arrivals  
Required Navigation Performance (RNP)  
Optimized Profile Descents (OPD)

Controller-Managed Spacing  
(CMS) in Terminal Airspace



Traffic Management Advisor  
with Terminal Metering (TMA-TM)





# Terminal Sequencing and Spacing:

## Proposed FAA TBFM Work Package 3 Capabilities



Flight Deck Interval Management  
(FIM) for Arrival Operations



NASA Technologies  
plus

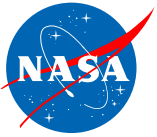
ADS-B Infrastructure

Area Navigation (RNAV) Arrivals  
Required Navigation Performance (RNP)  
Optimized Profile Descents (OPD)

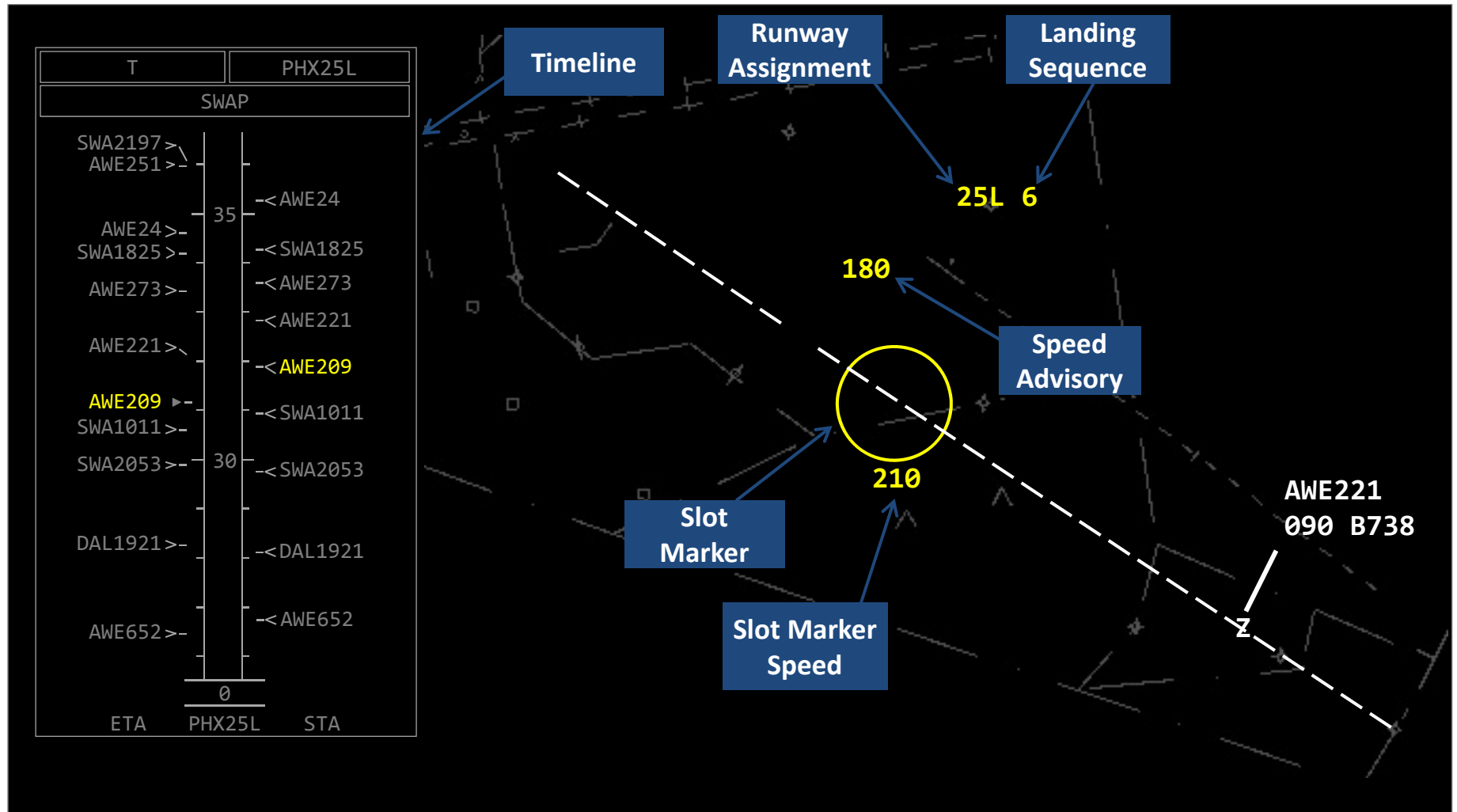
Controller-Managed Spacing  
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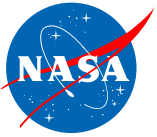


Traffic Management Advisor  
with Terminal Metering (TMA-TM)

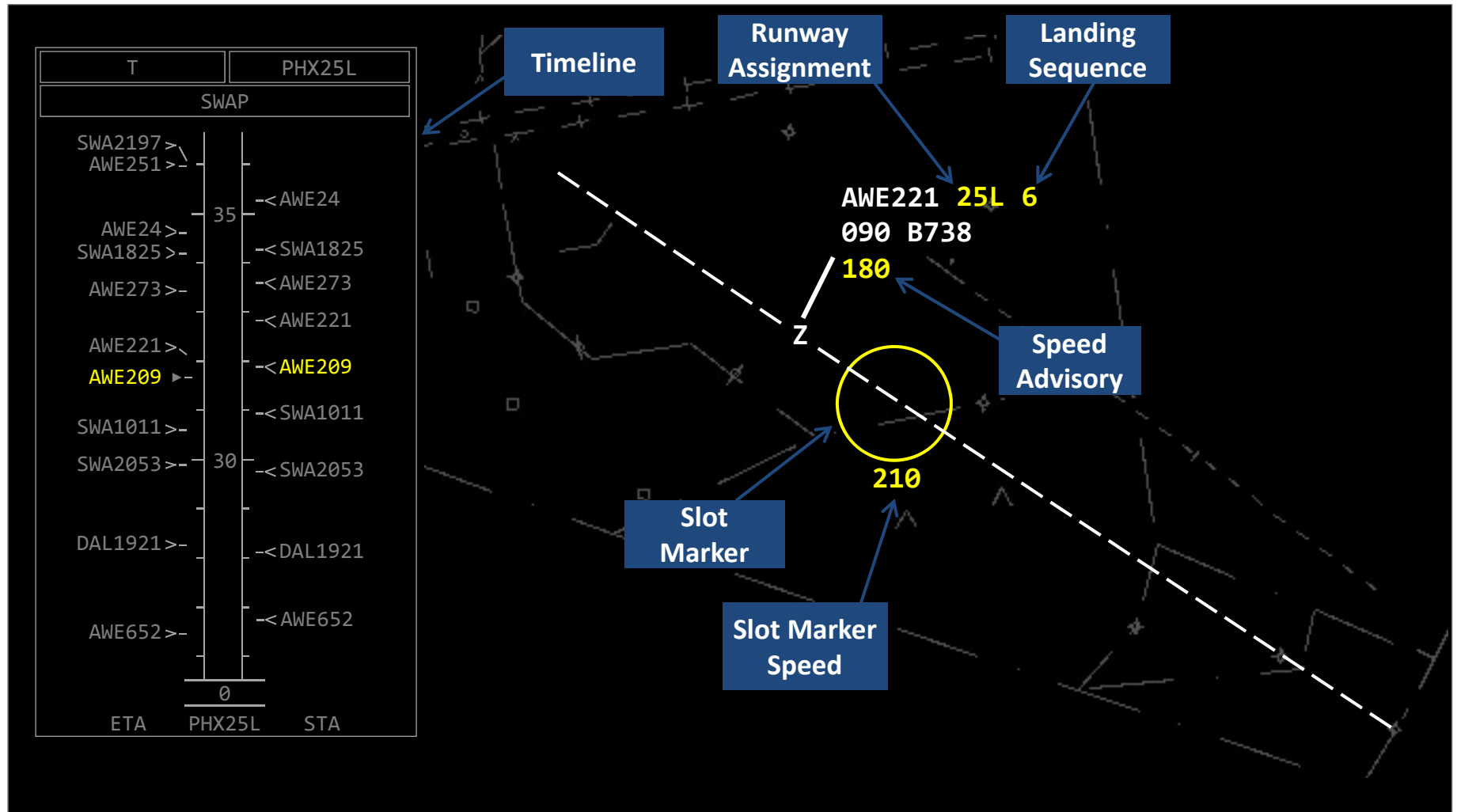


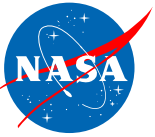
# NASA TSS Prototype Capabilities



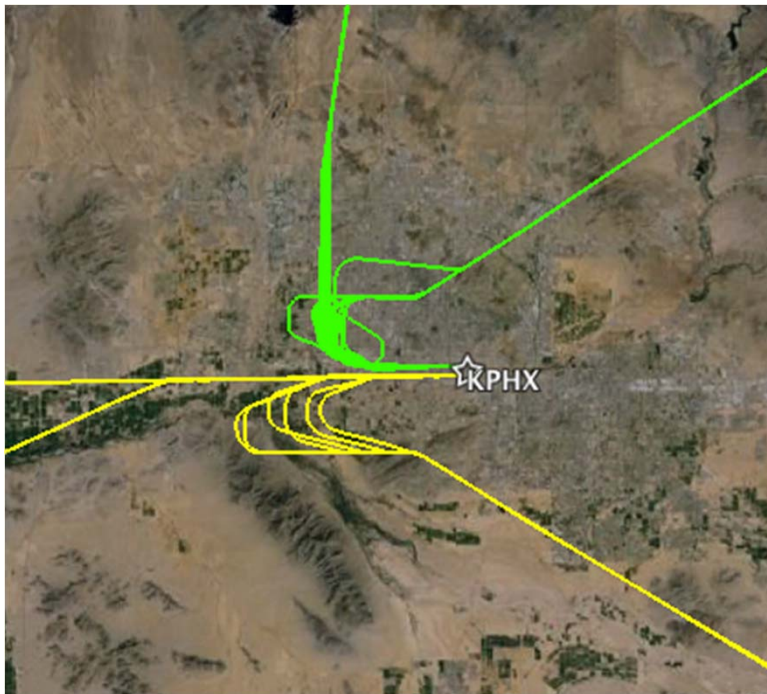


# NASA TSS Prototype Capabilities (Print)



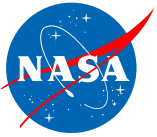


# Operational Improvement



During high-fidelity human-in-the-loop simulations of Terminal Sequencing and Spacing, air traffic controllers have significantly improved their use of PBN procedures during busy traffic periods without increased workload.





# Tech Transfer Strategy



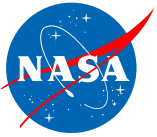
- Executed an aggressive, short timeframe development schedule
- Developed TSS prototype based upon FAA operational systems
- Conducted multiple joint FAA/NASA human-in-the-loop simulations
- Performed repeated incremental deliveries of tech transfer material to non-traditional RTT stakeholders
- Will continue to participate in later phases of FAA acquisition process



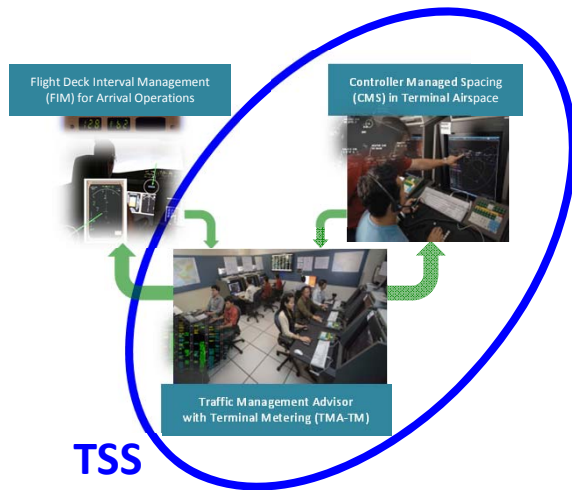
NextGEN







# ATD-1 Delivers to NextGen



- ATD-1 transferred Terminal Sequencing and Spacing (TSS) technologies to the FAA
- TSS enables routine use of underutilized advanced avionics and PBN procedures
- Potential benefits to airlines operating at initial TSS sites estimated to be \$300-400M/year
- FAA is planning for an initial capability in the NAS in 2018

**This is an unprecedented contribution of NASA technology to NextGen**